

Claims

What is claimed is:

1. A method for making silica, comprising:
delivering a silica precursor comprising a pseudohalogen to a conversion site;
and
5 passing the silica precursor through a flame to produce silica soot.
2. The method of claim 1, wherein the pseudohalogen is selected from a group consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyanato, selenocyanato, and isoselenocyanato.
3. The method of claim 1, wherein the silica precursor comprises silicon
10 tetraisocyanate.
4. The method of claim 1, wherein the silica precursor is delivered to the conversion site in vapor form.
5. The method of claim 1, wherein the flame is formed by combustion of a fuel.
6. The method of claim 5, wherein the fuel comprises CH_4 .
- 15 7. The method of claim 5, wherein the fuel comprises one selected from a group consisting of CO , $(\text{CN})_2$, D_2 , $(\text{CNO})_2$, and combinations thereof.
8. The method of claim 1, wherein the flame is a plasma.
9. The method of claim 1, further comprising delivering to the conversion site a compound capable of being converted to an oxide of at least one member of a group
20 consisting of B, Al, Ge, Sn, Ti, P, Se, Er, S, Ca, Ba, Y, Yb, Ta, La, Sb, and Bi.
10. The method of claim 1, further comprising delivering to the conversion site a compound capable of being converted to germania oxide.
11. The method of claim 10, wherein the compound comprises GeCl_4 .
12. The method of claim 10, wherein the compound comprises a pseudohalogen.

13. The method of claim **10**, wherein the compound comprises germanium isocyanate.
14. The method of claim **1**, further comprising an environment at the conversion site that is free of chlorine.
- 5 15. The method of claim **1**, further comprising delivering a fluorine-containing compound to the conversion site and passing the fluorine-containing compound through the flame to form silica soot doped with fluorine.
16. The method of claim **15**, wherein the silica precursor and the fluorine-containing compound are delivered to the flame in gaseous form.
- 10 17. The method of claim **16**, wherein the fluoride-containing compound is selected from the group consisting of CF_4 , $\text{CF}_4\text{Cl}_{4-x}$, where x ranges from 1 to 3, NF_3 , SF_6 , SiF_4 , C_2F_6 , and F_2 .
18. The method of claim **16**, wherein the silica precursor is delivered in a gas stream comprising an inert gas.
- 15 19. The method of claim **1**, further comprising depositing the silica soot on a deposition surface.
20. The method of claim **19**, further comprising consolidating the silica soot into glass.
21. The method of claim **20**, wherein the deposition surface is provided by a rotating mandrel.
22. The method of claim **21**, further comprising drawing the glass into a core cane.
- 20 23. The method of claim **19**, wherein depositing the silica soot on a deposition surface comprises simultaneously consolidating the silica soot into glass.
24. A method for making germania-doped silica comprising:
 delivering a silica precursor comprising a pseudohalogen and a germania precursor comprising a pseudohalogen to a conversion site; and
 25 passing the silica precursor and the germania precursor through a flame to produce the germania-doped silica.

25. The method of claim **24**, wherein the pseudohalogen is selected from a group consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyano, selenocyanato, and isoselenocyanato.
- 5 26. The method of claim **24**, wherein the silica precursor comprises silicon tetraisocyanate.
27. The method of claim **24**, wherein the germania precursor comprises germanium isocyanate.
28. A method for making silica, comprising:
delivering a silica precursor comprising a pseudohalogen and an oxidant inside
10 a heated tube to form silica; and
depositing the silica on an inner surface of the tube.
29. The method of claim **28**, wherein the pseudohalogen is selected from a group consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyano, selenocyanato, and isoselenocyanato.
- 15 30. The method of claim **28**, wherein the silica precursor comprises silicon tetraisocyanate.
31. The method of claim **28**, further comprising delivering a compound capable of being converted to an oxide of at least one member of a group consisting of B, Al, Ge, Sn, Ti, P, Se, Er, S, Ca, Ba, Y, Yb, Ta, La, Sb, and Bi inside the heated tube to
20 form doped silica.
32. The method of claim **28**, further comprising delivering a compound capable of being converted to germania oxide inside the heated tube to form germania-doped silica.
33. The method of claim **32**, wherein the compound comprises a pseudohalogen.
- 25 34. The method of claim **32**, wherein the compound comprises germanium isocyanate.

35. A method for making fused silica, comprising:

delivering a silica precursor comprising a pseudohalogen to a conversion site;
passing the silica precursor through a flame to produce silica soot; and
depositing the silica soot onto a deposition surface, wherein the silica soot is
immediately consolidated into glass.

36. The method of claim 35, wherein the pseudohalogen is selected from a group consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyanato, selenocyanato, and isoselenocyanato.

37. The method of claim 35, wherein the silica precursor comprises silicon tetrakisocyanate.

38. The method of claim 35, wherein the flame is formed by combustion of a fuel.

39. The method of claim 38, wherein the fuel comprises carbon monoxide.

40. An optical waveguide preform feedstock, comprising:
a pseudohalogen.

41. The optical waveguide preform feedstock of claim 40, wherein the pseudohalogen is selected from a group consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyanato, selenocyanato, and isoselenocyanato.

42. An optical waveguide preform feedstock, comprising:
a pseudohalogen capable of being converted to germania oxide.

43. The optical waveguide preform feedstock of claim 42, wherein the pseudohalogen is selected from a group consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyanato, selenocyanato, and isoselenocyanato.

44. The optical waveguide preform feedstock of claim 42, wherein the pseudohalogen comprises germanium isocyanate.

45. A method for manufacturing an optical fiber preform, comprising:
delivering a silica precursor comprising a pseudohalogen to a conversion site;
and
heating the silica precursor to produce silica.

- 5 46. The method of claim 45, wherein the silica precursor comprises tetrakisocyanate.
47. The method of claim 45, wherein the pseudohalogen is selected from a group consisting of cyano, isocyano, cyanato, isocyanato, thiocyanato, isothiocyano, selenocyanato, and isoselenocyanato.
48. The method of claim 45, further comprising a dopant compound.
- 10 49. The method of claim 48, wherein the dopant compound comprises GeCl_4 .
50. The method of claim 49, wherein a fuel combusted to provide the heating comprises CO .